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REVISION OF THE PHYLLOPOD GENUS *EUBRANCHIPUS*, WITH THE DESCRIPTION OF A NEW SPECIES

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RECENT changes in the nomenclature of the species of *Eubranchipus*, as well as additions to the number of described forms, make it desirable at this time to publish a summary of the members of this genus. Confusion of the various species has been due to inadequate descriptions and figures, as well as to a lack of knowledge regarding variations. Figures illustrating the taxonomic characters and a key are given here as an aid to identification.

These Anostraca are now assigned to the family Chirocephalidae Daday, which is characterized by the possession of eleven pairs of swimming appendages, bisegmented clasping antennae, and of laminar appendages, variable in structure, extending from the head of the male. The genus *Eubranchipus* Verrill of this family is characterized as follows: Cercopods long and somewhat diverse, setose along the margin, with distinct articulation to the last abdominal segment. A laminar appendage, variable in structure, occurs in the male on the basal segment of each clasping antennae. These laminar appendages are lacking in the female. The

clasping antennae of the male is composed of two parts, the apical part of which is movable. There are two branchial laminae on each of the swimming appendages. The apical segment of the penis, a cleft organ in this genus, is superficially smooth and elongate and apparently capable of protusion and retraction.

Recently Van Cleave (1928: 131) made the statement that *Eubranchipus dadayi* Pearse was a synonym of *Eubranchipus serratus* Forbes. I have examined the types of the former and specimens of *Eubranchipus serratus* from Urbana, Illinois, and agree that they are identical. The specimens from Urbana were sent to me by Dr. Van Cleave.

A description of *Branchipus gelidus* by O. P. and W. P. Hay (1889: 93) seems to me to differ only in very minor details from Forbes' account (1876: 13) of *Eubranchipus bundyi.* Forbes' description of the clasping antennae of the male agrees with that of the Hays except in the form of the apex. The only other discrepancy between the two descriptions is in the failure of Forbes to mention the peculiar lateral processes on the ninth and tenth segments in the female. It should be noted, however, that this process is not developed in the females of this species before sexual maturity, and also that the apex of the clasping antenna in the male is often quite distinctly more bifid than trifid. Thus the discrepancies in Forbes' description are accounted for. *Branchipus gelidus* Hay and *Eubranchipus gelidus* (Hay) of various authors I regard as synonyms of *Eubranchipus bundyi* Forbes.

The status of *Eubranchipus holmani* (Ryder) is much more uncertain. Daday (1910: 254) in his revision of the Anostraca refers the species described by Ryder as *Chirocephalus holmani* to the genus *Eubranchipus.* Daday justifies the reference of this species to this genus apparently on consideration of Ryder's figures. Ryder (1879: 148) makes no mention of the laminar appendages being separate as Daday describes them, but they are so indicated in Ryder's sketches which, however, in view of the following facts, have no reliable taxonomic value. In one of the figures the clasping antennae

has two segments and in another three, although his description is clear on this point. The author states that the laminar appendages arise from the base of the clasping antennae and figures them rising in one case from that position and in another from the middle portion of the forehead higher than the first antennae. Packard (1883: 352) gives an account of this species which agrees very well with that of Ryder, and he accompanies this description with a figure of the head of a male specimen. Owing to the difference in the figures of Packard and Ryder and a few discrepancies, which are probably to be attributed to the age of the specimens, Daday (1910: 271) bases a new name, *Branchinella gissleri,* on Packard's description. Packard possessed Ryder's types, and it seems highly improbable that he would have made such an error as to assign his specimens to Ryder's species if they were really distinct genera. The species in question should probably bear the name *Branchinella holmani* (Ryder). The genus *Branchinella* has been recently established by Daday (1910: 259). Ryder's types are no longer usable for comparison, since they are fragmentary and no additional specimens are known of *Eubranchipus holmani.* It should be noted that Fowler (1912: 51) secured at Chincoteague, Virginia, specimens of the species under consideration above. He calls this species the green fairy shrimp and figures it in his report on "The Crustacea of New Jersey." He assigns to it the name *Ino holmani* and is apparently unacquainted with the revision of the genus published the previous year by Daday.

In view of the foregoing discussion, the following species of *Eubranchipus* may be regarded as valid: *E. vernalis* (Verrill) 1869 (Figs. 3–4); *E. serratus* Forbes 1876 (Figs. 9–10); *E. bundyi* Forbes 1876 (Figs. 7–8); *E. ornatus* Holmes 1911 (Fig. 11–12); *E. neglectus* Garman 1926 (Figs. 1–2); and a new species which I am describing here as *E. oregonus* (Figs. 5–6).

Eubranchipus oregonus, sp. nov.

Male.—First antenna long, extending back as far as the first swimming appendage. The frontal appendage (Fig. 5)

is superficially oval. Microscopically the frontal appendage is rather narrowly triangular, becoming incurved and hence more oval at the proximal end. The frontal appendage is about one millimeter long and does not reach beyond the base of the first segment of the male clasping antenna. The outer margin of the frontal appendage is coarsely serrate, bearing between ten and eighteen teeth. The serrations on both margins are rather uniform, and are separate, since their bases do not touch the ones adjacent. A thickening of the appendage is evident at the point of attachment.

The terminal segment of the male clasping antenna (Fig. 6) is sickle-shaped, uniformly curved and smooth, with a small oval lobe on the inner side that is one eighth of the length of the segment. In many of the specimens examined the terminal segments are crossed, and the longer process of the terminal segment on the one side rests upon the small process of the terminal segment on the opposite side.

The cercopods are about as long as the four preceding abdominal segments. They are narrowly triangular, and bear feather-like setae on both the outer and inner margins. A few setae are found in the post-genital region laterally, on either side at the junction of the segments. A lateral protuberance on the basal segment of the penis on the inside is concave and horny and amber in color, and meets a like protuberance from the other half. The terminal segment is apparently in a retracted condition and is not visible in these specimens.

Female.—The second antennae are, in the female, irregular in shape and terminate in a sharp process which curves slightly outward. The labrum is like that of the male and is nearly straight on the sides, becoming wider and terminating in a squarish median lip. The first antennae are about as long as in the male.

The small female brood pouch, or ovisac, extends to the fourth post-genital segment. Its apex has a triangular lip below. In contour it is broadest beyond the middle. The eggs in the ovisac are large, and in these specimens never more

than three were found. As in the male, the post-genital segments are seven in number.

The series of specimens upon which this description is based was collected in February, 1927, by Prof. L. E. Griffin, near Portland, Oregon, in a pond which is supposedly spring-fed. Males in this collection average 14.3 mm. in length; the average for the females is 16.1 mm. The holotype, a male, and a female allotype are deposited in the collection of crustaceans in the University of Michigan, Museum of Zoology, as Cat. Nos. 52983 and 52984. Paratypes are catalogued as No. 52713. Paratypes have also been deposited in the United States National Museum.

Distribution

Members of this genus are known only from North America. They occur from coast to coast and from about thirty-six degrees north latitude to the coastal plains of the Arctic. The distribution of the species is as follows:

Eubranchipus oregonus is known only from the type locality in northern Oregon.[1]

Eubranchipus ornatus is reported from Wisconsin and Minnesota.

Eubranchipus serratus has been collected in Illinois, eastern Nebraska and Missouri.

Eubranchipus bundyi occurs in Alaska, Yukon Territory, Alberta, Quebec, New York, Massachusetts, Illinois, Wisconsin, and Michigan.

Eubranchipus vernalis is recorded from Michigan, Illinois, Indiana, Pennsylvania, New York, New Jersey, Massachusetts, and British Columbia.

Eubranchipus neglectus is known only from the type locality of the bluegrass region around Lexington, Kentucky.

The following key is given as an aid to the determination of the various species as distinguished in this paper.

[1] Since this paper has gone to press, specimens have been received of *Eubranchipus oregonus* from Stonewall, Oklahoma.

KEY TO THE SPECIES OF THE GENUS EUBRANCHIPUS

1a. Frontal appendage of male short, never extending beyond the basal segment of the clasping antenna.

2a. Frontal appendage of male nearly bilaterally symmetrical as regards dentition, the teeth on either side not greatly different in size. Apex of appendage acute.

3a. Frontal appendage with small teeth. Apical segment of male clasping antenna with a process pointing inward that is one fourth the length of the segment.

Eubranchipus vernalis (Verrill).

3b. Frontal appendage with large, separate teeth. Apical segment of male clasping antenna with a process pointing inward that is one eighth the length of the segment.

Eubranchipus oregonus Creaser.

2b. Frontal appendage not bilaterally symmetrical, the teeth on one margin much longer than on the opposite side. Apex of appendage obtuse or blunt ..... *Eubranchipus neglectus* Garman.

1b. Frontal appendage of male extending beyond the basal segment of the clasping antenna.

2a. Frontal appendage asymmetrical, the teeth on one side much longer than those on the opposite side.

3a. Terminal segment of male clasping antenna with a process pointing inward half as long as the segment.

Eubranchipus serratus Forbes.

3b. Terminal segment of male clasping antenna with a process pointing inward, one eighth as long as the segment.

Eubranchipus ornatus Holmes.

2b. Frontal appendage uniformly tapering, nearly bilaterally symmetrical with very small serrations.

Eubranchipus bundyi Forbes.

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Explanation of Plates

Figures 3–10 were drawn with the aid of a projection scope with the specimens mounted in glycerine in such a position as best to show the taxonomic characters. The measuring scale in each case is equal to one millimeter. Figures 1–2 and 11–12 are reproduced from the authors cited in the explanation of figures.

Plate I

Fig. 1. Frontal appendage of *Eubranchipus neglectus* (after Garman).

Fig. 2. Terminal segment of male clasping antenna of *Eubranchipus neglectus* (after Garman).

Fig. 3. Frontal appendage of *Eubranchipus vernalis.*

Fig. 4. Basal and terminal segments of male clasping antenna of *Eubranchipus vernalis.*

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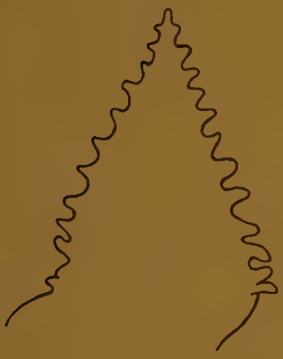
PLATE II

FIG. 5. Frontal appendage of *Eubranchipus oregonus.*

FIG. 6. Basal and terminal segments of male clasping antenna of *Eubranchipus oregonus.*

FIG. 7. Frontal appendage of *Eubranchipus bundyi.*

FIG. 8. Basal and terminal segments of male clasping antenna of *Eubranchipus bundyi.*



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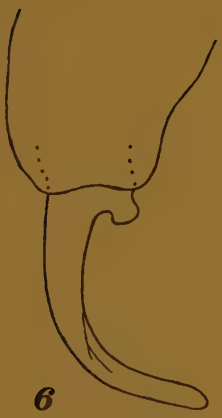

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PLATE III

FIG. 9. Frontal appendage of *Eubranchipus serratus.*

FIG. 10. Basal and terminal segments of male clasping antenna of *Eubranchipus serratus.*

FIG. 11. Frontal appendage of *Eubranchipus ornatus* (after Holmes).

FIG. 12. Basal and terminal segments of male clasping antenna of *Eubranchipus ornatus* (after Holmes).

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